

Hyampom Fire-Resilient Community Project Shasta-Trinity National Forest

Intent

The Shasta-Trinity National Forest, South Fork Management Unit and the Hyampom Fire Safe Council worked collaboratively to develop potential treatments that meet the following goals:

- Provide safe public egress and responder access along area roads,
- Interrupt large fire spread through the Hyampom area,
- Reduce potential for high intensity fire in the wildland-urban interface,
- Build resilience to disturbance (particularly high-severity fire) in the Hyampom area, and
- Restore and maintain ecosystem function, particularly the role of fire.

Process

Potential fire behavior (under 90th percentile wind and fuel moisture conditions) was used to determine the potential treatment types and locations. Potential treatment areas were evaluated by the fire safe council according to the following criteria:

- Strategic placement (relationship to fire movement & ignition locations)
- Relationship to community infrastructure (WUI, property lines, structures, transportation corridors, powerlines, and substations)
- Process complexity (difficulty and cost of implementation)
- Maintenance efficiency (difficulty and cost of implementation), and
- Restored ecosystem function (resilience, fostering mature forest development, habitat preservations and formation)

The following four prescriptions were identified as possible treatment options over an approximately 21,013 acre area in the Hyampom vicinity:

- Prescription 1: Ridgetop and Property Line Fuelbreaks (approximately 775 acres)
- Prescription 2: Roadside Buffers (approximately 1,119 acres)
- Prescription 3: Plantation Treatments (approximately 5,052 acres)
- Prescription 4: Fuel Modification & Prescribed Fire (approximately 14,068 acres)

Potential Treatment Methods Common to All Prescriptions

A combination of the following treatments could be utilized. Mechanical treatments would be restricted to 35% slope or less, but may treat short steeper pitches within the unit (up to 45% provided no adverse skidding occurs).

- **Whole tree yarding** is the pulling of the whole cut tree to the landing by machine (or cable system) to be processed on the landing site. This will reduce surface fuels in the unit lowering flame lengths and rates of spread.
- **Mastication** pulverizes or chops standing trees and logs into small particles. This treatment can include mowing, mulching, or chipping. Mastication reduces fuel height which reduces flame length, rates of spread, and crown fire initiation.

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- **Hand thinning** is the felling of trees in the plantations with a chainsaw. Trees would then be cut into smaller pieces. If resulting slash is deeper than 16 inches, then additional fuel treatments will occur as described below;
- **Hand piling** slash¹ will reduce surface fuels across the unit reducing flame lengths and rates of spread (piles vary in size but generally won't exceed 6 feet by 6 feet).
- **Machine piling** slash will reduce surface fuels across the unit reducing flame lengths and rates of spread (piles range in size but generally won't exceed 10 feet in height and 30 feet in width).
- **Pile burning*** will reduce only surface fuels that are piled. This treatment will lower flame lengths and rates of spread, reduce crown fire initiation, and lower active crown fire potential.
- **Jackpot burning*** is a prescribed fire to deliberately burn natural or modified concentrations (jackpots) of wildland fuels under specified environmental conditions, which allows the fire to be confined to a predetermined area and reduces the fireline intensity and rate of spread required to attain planned resource management objectives. This burning can be carried out when larger fuel is dry enough to burn, but fine fuel is too wet or too discontinuous to sustain fire.
- **Broadcast burning*** is a prescribed burning activity where fire is applied generally to most or all of an area within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both. This is the most effective treatment for reducing surface fuel loading. This treatment will lower flame lengths and rates of spread, reduce crown fire initiation, and lower active crown fire potential.
- **Fire Line Construction** is the act of scraping all combustible material away, exposing bare soil. Firelines are usually 2-10' in width depending on the orientation to the slope, position on the slope, steepness, vegetation type, and method of line construction (hand tools or equipment).
- **Control Line Preparation** occurs adjacent to the fire line (or other control feature, such as a road) and primarily consists of cutting brush and small-diameter trees and pruning trees to a height of up to 8 feet. Preparation could occur up to 100 feet from the fire line, depending on fuel conditions. Fuels manipulated for control line preparation may be masticated/chipped, piled and burned in advance of broadcast burning, lopped and scattered within the broadcast burn unit, or scattered outside the unit. In order to reduce erosion potential, cut material can sometimes be used for the repair of control lines when burning is complete, by scattering or chipping material onto the line.
- **Pruning** lower branches on remaining trees to a canopy base height of eight feet removes ladder fuels, reducing the chance of crown fires.
- **Utilization of thinned material** (slash/tree tops/logs) whenever possible. This can include commercial or personal firewood. This treatment reduces flame lengths, rates of spread, continuity of fuels and the amount of smoke production from pile burning.
- **Goat Grazing**-consists of removing competing vegetation by goats. Goats eat green vegetation and limited amounts of woody material including seedlings and saplings. Goats are confined to the plantations through the use of a temporary fencing.
- **Release** is the cutting of competing vegetation with conifer trees.
- **Reforestation**-is the planting of native conifer seedlings. Reforestation will occur in plantations where gaps have been created by insect or disease issues or storm damage, or where the species composition of the plantation does not reflect the natural stands located adjacent to the plantation.

*Multiple entries with prescribed fire may be necessary, as a part of this proposal, to achieve and maintain the desired fuel profiles (reduced surface fuel loading and increased crown base height). Post-burn monitoring will inform the assessment of when and if additional entries are needed.

¹ Vegetation debris consisting of both existing fuels and fuels resulting from project implementation.

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Maintenance of Treatments

The treatments would be maintained over time to retain the fuels reduction and fire behavior modification benefits, improve establishment of planted trees, and guide the development of the forest toward desired conditions. The maintenance treatments would occur over the same areas where initial treatments are planned.

The maintenance treatment areas are and will be characterized by discontinuous ladder fuels and surface fuels, and these conditions need to be maintained over time. It is recommended that these areas be monitored every 3-7 years to determine if it still meets the fire behavior objectives of surface fire behavior under 90th percentile fuel moisture conditions. When the area begins to exceed the fire behavior objectives, the following treatments will need to be implemented either alone or in combination: goat grazing, broadcast burning, cut live and dead brush, reduce ladder fuels 8 inches DBH or less, machine/hand pile, jackpot burning, and pile burning.

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Prescription 1: Ridgetop & Property Line Fuelbreaks

This prescription is similar to a collaborative fuelbreak prescription that is currently being developed by local agencies and private landowners in the vicinity of the Shasta-Trinity National Forest. The intent is to modify fire behavior in strategic locations. Thinning could also create openings and leave clumps of trees to resemble historic stand structure. This prescription could be used along the ridge system extending from Bennett Peak to the South Fork Trinity River, a high hazard area, given current fuel conditions and wind-flow patterns in the river canyon. The prescription could also be utilized along the property boundary in the vicinity of Kerlin Creek.

Prescription Goals

Fuel Layer	Composition	Treatment Purpose	Treatment Goal
Surface	Litter, woody debris, grass, brush and other dead and live vegetation within 6 ft. of the ground	Allow for safe direct action by hand crews	Sustain flame lengths of 4 ft. or less (approx. 5 ton/acre or less surface fuels)
Ladder	Fuels that connect the surface with the canopy	Prevent initiation of crown fire with 4 ft. surface flame lengths	Canopy base height 10ft. or greater
Canopy	Crowns of intermediate, codominant and dominant vegetation	Increase canopy spacing to prevent sustained crown fire activity	Canopy bulk density below 0.1kg/m ³

Prescription Design

Fuel Layer	Prescription
Canopy (Over 10" dbh)	<ul style="list-style-type: none">• Thin from below to basal area of 50 -110, no diameter limit• Canopy spacing of 10 ft. on flat ground, up to 30 ft. with increase in slope• Minimum residual canopy cover of 30-40% (canopy bulk density <0.1)

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Understory (Below 10" dbh, ladder and surface fuels)	<ul style="list-style-type: none">• Thin from below non-commercial understory up to 10 inch dbh.• Prune leave trees to 10 ft.• Remove residual fuels via pile burning/underburning to achieve surface fuel target of less than 5 tons per acre.• Retain 1 to 5 logs 20 inches in diameter (coarse woody debris) per acre
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Species Preference

When implementing fuel breaks, keeping the largest, best formed and most fire resistant individuals and species is desirable. These trees have the most potential for shading the fuel break, are most likely to survive in the event of a fire event and in young stands, offer the fastest path towards developing a shaded fuel break. The following is a general species preference list:

- Deciduous Oaks (Black oak, White Oak, Blue Oak, Valley oak)
- Tan Oak (tree form)
- Madrone
- Sugar Pine
- Ponderosa Pine
- Doug Fir
- Incense Cedar
- Other hardwoods (Sycamore, Chinquapin, buckeye, etc.)
- Live Oak

Prescription 2: Roadside Buffers

This prescription is similar to the prescription developed by the Trinity County Collaborative for the Roads and Plantations Pilot Project, with a few exceptions.

The prescription includes thinning activities along some road segments in the treatment footprints. Treatment prescriptions differ based on land management allocation objectives of the Forest Plan, and project specific resource protection measures would be included to eliminate, reduce, and minimize impacts.

The roadside treatment area would be generally 600 feet total width (not including the width of the system road, shoulder to shoulder). Fuel reduction treatments could occur within the entire buffer. The intent is to have less fuel loading along the road with the treatment feathering into the natural stand with more fuel loading away from the road². Where treatments result in utilizable material, products could be offered.

This prescription could be used to create safer access and egress along segments of the following roads 3N10, 3N20, 3N21, and County roads 316 and 311.

Overall Silvicultural Prescription Goals

- Thin stands to retain the best, healthiest trees that have a high canopy capacity (those with the strongest crown to bole ratio, have the highest needle or leaf cover and provide the most shade to the forest floor), capable of maintaining those objectives for a long period of time within the buffer area.
- Designate for removal suppressed, intermediate, and codominant conifer trees that compete with the best, healthiest trees that have a high canopy capacity, based on the thinning objective by stand type. This is to reduce continuity of vegetation, and competition for available site resources.
- Where snag and coarse woody debris levels are higher than needed to meet forest plan requirements, additional snags and fading trees may be cut and removed to reduce fuel levels that would build up if those trees were to die and fall.
- Remove pre-dominant, dominant, and codominant trees in obvious decline, especially potential mortality in clumps or clusters that could compromise the effectiveness of the roadside safety corridor.
- Those trees that provide valuable wildlife structures may be considered as part of the shade retention objective.
- Outside the dripline of larger trees designated for retention, retain vigorous clumps of healthy intermediate mixed conifer trees to provide for more complex stand diversity and a source of future mature trees.

² Surface fuels includes all fuels (live and dead) that could influence surface flame length and/or contribute to crown fire initiation: Leaf/needle litter, dead and down, live brush, and small trees up to 8 inches d.b.h. This includes tree limbs up to a height of 8 feet.

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- Retain hardwood trees. Culture hardwood clumps to one to three dominant stems where appropriate.
- Reduce fuel loading to 10-20 tons/acre (consistent with Forest Plan Management Prescriptions) including brush and down logs.

Stand Type Thinning Objectives

Stand Type	Thinning Objective	Retention Preference
Upland Mixed Conifer Stands (UMCS)	<p>D + 6</p> <p>Space trees less than 16 inches 22 feet from one another. See Appendix A for Spacing over 16 inches. Target Residual TPA determined by the diameter of leave trees (range from approximately 28 to 105 trees per acre for stands with a QMD less than 35 inches)</p>	<ul style="list-style-type: none"> ▪ all sugar pine uninfected with (white pine blister rust (WPBR)) ▪ vigorous Douglas-fir ▪ all uninfected (mistletoe) ponderosa/Jeffrey pine ▪ incense cedar ▪ white fir
Upland Pine Stands (UPS)	<p>D + 10</p> <p>Space trees less than 16 inches 26 feet from one another. See Appendix A for Spacing over 16 inches. Target Residual TPA determined by the diameter of leave trees (range from approximately 22 to 70 trees per acre for stands with a QMD less than 35 inches)</p>	<p>all uninfected (WPBR) sugar pine all uninfected (mistletoe) ponderosa/Jeffrey pine vigorous Douglas-fir incense cedar white fir</p>
High Value Wildlife Stands (HVWS)	<p>D + 4</p> <p>Space trees less than 16 inches 20 feet from one another. Maintain 10 clusters (3 to 5 trees) per acre outside of the dripline of dominant and codominant trees. These clusters would be considered an individual trees less than 16 inches for spacing (approximately 20 feet). See Appendix A for Spacing over 16 inches. Target Residual TPA determined by the diameter of leave trees (range from approximately 25 to 109 trees per acre for stands with a QMD less than 35 inches)</p>	<p>all uninfected (WPBR) sugar pine vigorous Douglas-fir all uninfected (mistletoe) ponderosa/Jeffrey pine incense cedar white fir</p>
Riparian Reserve Stands Outside of	<p>Understory treatment Remove all conifer trees less than 8 inches</p>	<p>Retain all true-riparian vegetation</p>

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Stand Type	Thinning Objective	Retention Preference
Plantations outside of inner gorges and active landslide areas	located within the dripline of a larger trees. Space trees less than 8 inches 20 feet from one another. Retain all conifers > or + 8 inches	
Oak Woodlands	Thin multi-stemmed oaks down to 1 to 3 stems, depending on size. Remove all conifers from oak-dominated areas, except dominant and predominant trees (these are generally exceeding 24 inches in diameter).	Retain all oak individuals. Culturing and pruning of oaks is permitted.
Brush Fields	Thin brush fields to retain clumps of brush (or individual shrubs) up to 10 feet in diameter spaced 20 - 30 feet apart. Shrub/clump spacing distance will increase with slope. Remove all brush from under the drip line of leave trees. Leave trees within the brush field will be pruned to a maximum of 8 feet from the ground or no more than half of the live crown. Hardwoods less than 6' tall will be considered brush and may be thinned accordingly. Residual hardwoods may be cultured to 1 – 3 dominant stems and pruned up to 8' or half of the live crown.	Retain all dominant and predominant trees (these are generally exceeding 24 inches in diameter).

(D+ is a silvicultural prescription that uses the diameter of the tree in inches and takes that same number in feet plus the additional spacing to meet the objectives.)

Prescription 3: Plantation Thinning

This prescription includes a silvicultural prescription for thinning, as well as fuels management treatments. This prescription was developed, initially, for the Westside Plantations project and was refined for the Dubakella Insect and Disease Project. This prescription could mitigate the threat of high-intensity fire behavior and high severity fire effects in plantations within and around the Hyampom community.

Silvicultural Prescription Summary

In general, the treatments are structured to accomplish a variable density thinning³ in plantation stands. To create a density thinning, the spacing is varied to retain not only the healthiest of trees, but a mix of species currently growing on the site. Approximately 55 to 80 percent of the total competing vegetation will be removed. The number of trees per acre remaining post-project varies depending on the Forest Plan management prescription in which the unit is located (e.g. Riparian Reserve, Late-Successional Reserve), the stand species (e.g. mixed conifer, pine forest), site quality and the average tree size. Approximately 45 to 150 trees per acre will be retained after treatment.

The silvicultural prescription, for treatment units in all management prescriptions, is to thin with the following priority of tree retention:

- The largest, oldest and/or legacy trees will not be removed unless they pose a safety threat or are infected with insects or disease. If cut, they will be left on site unless the fuels objectives for the site will not be met.
- Non-blister rust-infected sugar pine (*Pinus lambertiana*) will be retained except when required to attain desired residual stocking levels.
- Healthy dominant and co-dominant hardwood species will be retained and will count in spacing criteria. When hardwoods have multiple stems, retain the dominant 1-3 stems.

General Specifications for All Silvicultural Prescriptions

- Trees forked below DBH are considered two trees; trees forked above DBH are considered one tree.
- All cut material shall be lopped to a maximum depth of 16 inches.
- Cut all shrubs and suppressed and intermediate hardwoods within five feet of any leave tree except within riparian reserve areas. Thin the codominant and dominant clumps to the dominant stems, leaving 1-3 stems.
- Spacing range is variable, that is, two or more trees can be left in clumps if no other trees are present in the vicinity; however, the TPA target shall not be materially increased.
- All cut trees/shrubs shall be cut below the lowest live limbs, except when prevented by natural obstacles. The maximum allowable stump height is 6 inches measured from the high side of the tree/shrub. All live limbs below the cutting point shall be removed. Trees/shrubs shall be completely severed from the stump.
- Cut trees shall be felled away from unit boundaries, roads, telephone lines, established trails, stock driveways, fence lines, established land corners and streams. Any trees falling on such areas shall be removed.
- Plantations that have experienced storm damage in the form of wind-throw and top-breakout will have gaps larger than 1 acre post treatment.
- Remove all significantly damaged trees (i.e. top killed, broken tops, etc.) that are not legacy trees and are in excess of snag retention requirement. In some cases, this will result in understocked areas and openings of several acres.

³ Variable density thinning (VDT) is a silvicultural strategy designed to accelerate development of late-successional habitat by applying a variety of harvest intensities within a stand. Willis, J.L. 2018.

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Summary of the silvicultural prescriptions by Forest Plan management prescription

Stand Type	Tree Density		
	All Management Prescriptions but LSR and Riparian Reserves	Late-Successional Reserves (LSR)	Riparian Reserves
Pine Stands less than 10 inches in diameter	Average 105 trees/ac (21'x21' spacing) with substantially varied spacing and gaps up to 0.25 acres	Average 105 trees/ac (21'x21' spacing) with substantially varied spacing and gaps up to 0.25 acres	Average 105 trees/ac (21'x21' spacing) with varied spacing
Mixed Conifer Stands less than 10 inches in diameter	Average 135 trees/ac (21'x21' spacing) with substantially varied spacing and gaps up to 0.25 acres	Average 135 trees/ac (21'x21' spacing) with substantially varied spacing and gaps up to 0.25 acres	Average 135 trees/ac (18'x18' spacing) with varied spacing
Stand Type	Tree Density		
All Stands greater than 10 inches in diameter	Depending on dbh and species, average 45 to 100 trees/ac including created openings up to 3 acres in size. Openings may be several acres in size if there is an active forest health agent causing mortality and damage	Depending on dbh and species, average 45 to 100 trees/ac including openings up to .25 acres in size	Depending on species, average 105 to 135 trees/ac
Priority Leave Trees	Conifers (priority for retention is: sugar pine, Douglas-fir, ponderosa and Jeffrey pine, incense cedar, white fir) that are dominant, co-dominant, intermediate while encouraging species diversity. Retain all dominant and co-dominant class hardwoods.	Conifer retention will be to ensure species diversity for that vegetation-type, provide for vertical diversity utilizing a mixture of conifer, hardwood and shrub species and maintain areas of heavy canopy closure and decadence.	Conifers (priority for retention is: sugar pine, Douglas-fir, ponderosa and Jeffrey pine, incense cedar, white fir) that are dominant, co-dominant, intermediate while encouraging spp diversity. Retain all dominant, co-dominant and healthy intermediate class hardwoods.

Fuels Prescription Summary

Fuel treatments within the plantations are intended to decrease the horizontal and vertical continuity of fuel profiles; they will create and maintain fuel loadings and arrangements that would promote primarily surface fire behavior under 90th percentile fuel moisture conditions. Treatments will focus on dead and live surface, ladder, and understory fuels. Treatment method depends on the percent slope, access, location of control features, opportunities for utilization, and specific unit objectives.

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Thinning units on less than a 35 percent slope will be masticated, hand piled or machine piled and burned, jackpot burned, broadcast burned, and/or grazed by goats. For units greater than 35 percent slope, fuels treatments will be limited to hand cutting with a chainsaw and hand piling and burning, goat grazing, jackpot burning, and/or broadcast burning.

Some thinning units will be whole-tree yarded. For those units that do not meet fuels objectives after the silvicultural treatments have been conducted, one or more of the following secondary fuels treatments may occur: hand pile and burning, broadcast burning, machine piling and burning, mastication, or goat grazing. Machine piling and burning and mastication will only occur on slopes less than 35 percent.

For those treatment units with a shrub component, 60 - 80 percent of the shrub species, and all shrubs within 5 feet of the dripline of leave trees, will not exceed 24 inches in height. The desired condition for residual shrubs is a mosaic of shrub ages and patch sizes. Brush will be thinned to retain clumps of brush (or individual shrubs) up to 10 feet in diameter spaced 20 - 30 feet apart. Shrub/clump spacing distance will increase with slope. All brush may be removed from under the drip line of leave trees. Hardwoods less than 6 feet tall will be considered brush and may be thinned accordingly, retained hardwoods may be pruned up to 8 feet or half of the live crown (whichever is less).

Limited lop and scatter of cut material may occur in units that will be broadcast burned. Slash shall not exceed 16 inches in depth, will not occur within the dripline of residual trees, and only in units where residual trees have been pruned to 6-8 feet. Lop and scatter will only occur in units, or portions of units, where the resulting fuel loading will not result in unintended fire behavior or control issues during future wildfires and/or planned broadcast burning.

All treated acres could receive follow-up goat grazing, hand piling and burning, jackpot burning, and/or broadcast burning after primary treatments, if it is deemed necessary by the fuels specialist to meet desired fuel conditions.

Only hand treatments (or goat grazing) are allowed within EEZs, mechanical treatments can occur at the edge where the equipment can reach in, however no tracked equipment entry is allowed in the EEZ with the exception of approved channel crossing locations

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Prescription 4: Fuel Modification & Prescribed Fire

Areas not identified for the prescriptions described above would also receive treatment. The following are possible fuel modifications that could occur under this prescription:

- Thinning and piling brush and small-diameter trees (generally up to 8" dbh)
 - Trees would generally be thinned to 20 – 25 foot spacing.
 - Brush fields would be thinned to retain clumps of brush (or individual shrubs) up to 10 feet in diameter spaced 20 - 30 feet apart.
 - Shrub/clump spacing distance will increase with slope.
 - All brush would be removed from under the drip line of leave trees.
- Pruning residual trees to 8'-10'
- Burning hand piles and machine piles
- Chipping and masticating
 - as an alternative to piling and burning, where access is possible and slope is not too steep
- Goat grazing
- Jackpot burning
- Broadcast burning

Species Preference

The following is a general species preference list (in order of highest preference):

- Deciduous Oaks (Black oak, White Oak, Blue Oak, Valley oak)
- Tan Oak (tree form)
- Madrone
- Sugar Pine
- Ponderosa Pine
- Doug Fir
- Incense Cedar
- Other hardwoods (Sycamore, Chinquapin, buckeye, etc.)
- Live Oak

Broadcast Burning

Specific areas will be evaluated for the suitability of broadcast burning prior to implementation, and all burning will be conducted under an approved prescribed fire plan and smoke management plan. The landscape may be segmented and compartmentalized for broadcast burning based on the locations of control lines. Roads, rivers, non-burnable areas, and previously burned areas may be used as control line locations. Control lines may be created by hand or equipment on ridges or other favorable terrain. Control lines may be prepared as defined in Treatment Methods Common to All Prescriptions (above). Backing, flanking, or head fire could be utilized to meet the objectives and desired fire effects of the prescribed fire.

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Anticipated Fire Effects

Generally, low severity prescribed fires will be implemented to meet desired conditions. However, small pockets of moderate-to-high severity, as well as pockets that are unburned or very lightly burned, will also help to meet desired conditions. When evaluating an area post-burn, fire effects will be averaged across the burned area.

Prescribed fire objectives may vary between NSO suitable habitat, plantations, and stands that are neither. All objectives are to be met immediately post burn, unless otherwise stated in the tables below. The indicators above are derived from the Composite Burn Index method of assessing burn severity (Key and Benson 2006).

Acceptable Degree of Change Within NSO Suitable Habitat:

Strata / Rating Factor	Ideal Burn Severity Indicator Range
Substrates	
Litter and light fuels (0-3") consumed	50 – 100% litter; 25 – 90% light fuels
Duff	Light char - 50% consumption, deep char
Medium fuel (3-8")	20 – 40% consumption
Heavy fuel (>8")	10 – 35% consumption, deep char
Total soil/rock cover	10 – 50 % soil cover change
Herbs, Low Shrubs, and Trees Less Than 3 Feet	
Percent foliage altered (black/brown)	30 – 80%
Frequency percent living	20 – 90%
Anticipated colonizer potential	Low - Moderate
Anticipated change in species composition/ relative abundance 2-3 years post-burn	Low - Moderate
Tall Shrubs and Trees 3 to 16 feet	
Percent foliage altered (black/brown)	10 – 50%
Frequency percent living	45 – 95%
Percent change in cover	5 – 55%
Anticipated change in species composition/ relative abundance 2-3 years post-burn	Low - Moderate
Intermediate Trees (Sub-canopy, Pole-sized Trees)	
Percent green (unaltered)	80 – 100%
Percent black (torched)	0 – 20%
Percent brown (scorched/girdled)	0 – 20%
Percent canopy mortality	0 – 15%
Char height	0 – 5 ft
Big Trees (Upper Canopy, Dominant and Codominant Trees)	
Percent green (unaltered)	90 – 100%
Percent black (torched)	0 – 10%
Percent brown (scorched/girdled)	0 – 10%
Percent canopy mortality	0 – 10%
Char height	0 – 6 ft

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Acceptable Degree of Change Within Plantations:

Strata / Rating Factor	Ideal Burn Severity Indicator Range
Substrates	
Litter and light fuels (0-3") consumed	50 – 100% litter; 25 – 90% light fuels
Duff	Light char - 50% consumption, deep char
Medium fuel (3-8")	20 – 40% consumption
Heavy fuel (>8")	10 – 35% consumption, deep char
Herbs, Low Shrubs, and Small Trees	
Percent foliage altered (black/brown)	30 – 80%
Frequency percent living	20 – 90%
Biggest Trees (Upper Canopy)	
Percent canopy mortality	0 – 15%

Acceptable Degree of Change Outside of NSO Suitable Habitat and Plantations:

Strata / Rating Factor	Ideal Burn Severity Indicator Range
Substrates	
Litter and light fuels (0-3") consumed	50 – 100% litter; 25 – 90% light fuels
Duff	Light char - 50% consumption, deep char
Medium fuel (3-8")	20 – 40% consumption
Heavy fuel (>8")	10 – 35% consumption, deep char
Total soil/rock cover	10 – 50 % soil cover change
Herbs, Low Shrubs, and Trees Less Than 3 Feet	
Percent foliage altered (black/brown)	30 – 80%
Frequency percent living	20 – 90%
Anticipated colonizer potential	Low - Moderate
Anticipated change in species composition/ relative abundance 2-3 years post-burn	Low - Moderate
Tall Shrubs and Trees 3 to 16 feet	
Percent foliage altered (black/brown)	10 – 90%
Frequency percent living	30 – 95%
Percent change in cover	5 – 70%
Anticipated change in species composition/ relative abundance 2-3 years post-burn	Low - Moderate
Intermediate Trees (Sub-canopy, Pole-sized Trees)	
Percent green (unaltered)	75 – 100%
Percent black (torched)	0 – 25%
Percent brown (scorched/girdled)	0 – 25%
Percent canopy mortality	0 – 25%
Char height	0 – 6 ft
Big Trees (Upper Canopy, Dominant and Codominant Trees)	
Percent green (unaltered)	85 – 100%
Percent black (torched)	0 – 15%
Percent brown (scorched/girdled)	0 – 15%
Percent canopy mortality	0 – 15%
Char height	0 – 9 ft

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Methods

Integrated hazard was generated from the Landscape Burn Probability model in the Interagency Fuel Treatment Decision Support System (IFTDSS) [<https://iftdss.firenet.gov/>].

Historic fuel moisture and weather conditions were used to model future conditions. 90th percentile fuel moisture conditions were used to predict fire behavior in the project area. Fuel moistures were obtained from the Percentile Weather function of the Fire Family Plus (Bradshaw and McCormick 2000) program using data collected by the Hayfork, Underwood, Friend Mountain, and Big Bar Remote Automated Weather Stations (RAWS) during the period of May 1 to October 31 from 2008 to 2017. The values represent the actual combination of fuel moistures that have resulted in an Energy Release Component (an index within the National Fire Danger Rating System used to measure seasonal-scale trends in fire danger) in the 90th percentile. The intent is to capture the peak fire season conditions. Fire Family Plus was also used to analyze historic wind patterns based on hourly observations from 1200 to 1900, between May 1 and October 31, 2008 to 2017, at the same RAWS stations. The 90th percentile wind speed (converted from 10-minute average to 1 minute average) is 12 miles per hour (Crosby and Chandler 1966). A wind rose analysis demonstrated that strong winds typically occur out of the west/northwest.

90th Percentile Fuel Moisture and Wind Parameters

Parameter	Value
1-hour fuel moisture (0 to 0.25 inch diameter)	3%
10-hour fuel moisture (0.25 to 1 inch diameter)	4%
100-hour fuel moisture (1 to 3 inch diameter)	8%
Herbaceous fuel moisture	31%
Woody fuel moisture	71%
Foliar Moisture	100%
20-foot wind speed, direction	12 miles per hour, 300 degrees

Conditional burn probability was generated by modeling 1,016 random ignitions in and around the Hyampom landscape, under the conditions above, for 12 hours. The average modeled fire size was 4,118 acres.

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Glossary

Integrated wildfire hazard*

Integrated wildfire hazard combines two important measures of wildfire—burn probability and conditional wildfire intensity—into a single characteristic that can be mapped. Integrated wildfire hazard is the product of burn probability and conditional wildfire intensity, where intensity is expressed either as the expected flame length or as the expected fireline intensity, depending upon which is used to characterize wildfire intensity.

Conditional flame length (CFL)*

The mean flame length at a point, quantified as the mean flame length simulated with a Monte Carlo fire occurrence simulator. Conditional flame length is one of two common measures of conditional wildfire intensity (the other is mean fireline intensity).

Conditional burn probability*

Burn probability given a specific set of defining criteria. The specific criteria can be a weather scenario and a fixed, usually short period of active fire spread. Conditional burn probability is calculated for use in hazard and threat assessments that use FlamMap5 rather than FSIM or FSPro. The flame length probabilities reported by FSIm and FlamMap5 are conditional.

*from Scott, Joe H.; Thompson, Matthew P.; Calkin, David E. 2013. A wildfire risk assessment framework for land and resource management. Gen. Tech. Rep. RMRS-GTR-315. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83 p.

National Wildfire Coordinating Group Glossary of Wildland Fire: <https://www.nwcg.gov/glossary/a-z>

See the NWCG glossary for definitions of fuels and fire terms used in the prescriptions above.

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